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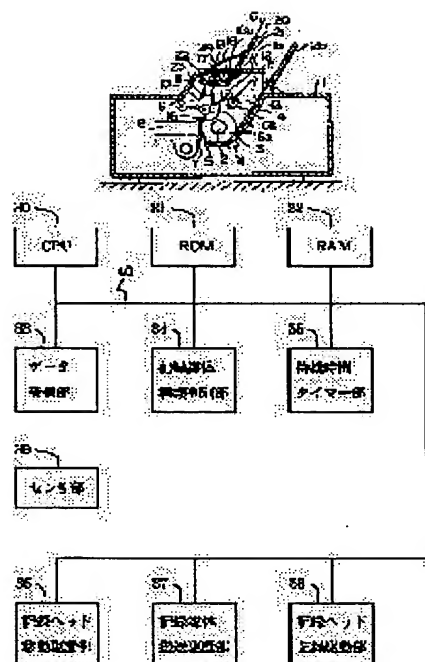
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(54) INK-JET RECORDER

(57)Abstract:

PURPOSE: To make it possible to prevent contamination and offset caused by ink by providing a means, which can vary the standby time before the start of the back surface recording after the end of the front surface recording of a recording medium in double-surface recording in response to the kind of the recording medium.

CONSTITUTION: When the recording for one page is finished, a recording medium 6 is discharged. When the recording operation is made for one-surface recording, the recording medium 6 is discharged on a paper tray 20. For the double-surface recording, the medium is set at a sucking position for back-surface recording. When the recording medium 6 is set at the sucking position for the back-surface recording, the recording is made to wait for the specified time before the start of the back-surface recording. For the standby time, the standby time corresponding to the preset kind of the recording medium 6 is set in the timer of a CPU30. The waiting is performed by driving a timer 35. After the elapse of the preset time of the timer, the recording medium 6 is sucked, the recording data are received from a host computer by the same way as the operation in front-surface recording and the recording is performed for every one line. After the recording of one page is finished, the recording medium 6 is discharged, and the front-surface recording and the back-surface recording are completed.



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CLAIMS

[Claim(s)]

[Claim 1] An ink jet recording device characterized by having an ink jet record means which records by breathing out ink according to a signal, a conveyance means to convey a record medium at the time of one side and double-sided record, and a means which carries out adjustable [of the standby time before an after / surface record termination / rear-face recording start of a record medium at the time of double-sided record] according to a class of said record medium.

[Claim 2] An ink jet recording device characterized by having a means which carries out adjustable [of an ink jet record means which records by breathing out ink according to a signal, a conveyance means to convey a record medium at the time of one side and double-sided record, and record concentration at the time of one side record and record concentration at the time of double-sided record].

[Claim 3] Said ink jet record means is an ink jet recording device according to claim 1 or 2 characterized by having an electric thermal-conversion object for generating heat energy for ink regurgitation.

[Claim 4] Said ink jet record means is an ink jet recording device according to claim 3 characterized by making ink breathe out from a delivery with heat energy impressed with said electric thermal-conversion object using film boiling produced in ink.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001] [Industrial Application] This invention relates to the ink jet recording device which has especially perfecting machine ability about the ink jet recording device which records by breathing out ink according to a signal.

[0002]

[Description of the Prior Art] By driving the dot means forming of a recording head based on a record signal, recording devices, such as a printer and facsimile, are constituted so that the dot pattern corresponding to said signal (image information) may be formed on the record medium (usually record sheet).

[0003] Although there is a recording device using the ink jet method as one format of said recording device, this makes an ink drop fly according to said signal from a recording head, makes said ink drop adhere to record media, such as a record sheet and plastics sheet metal, and forms an image.

[0004] Conventionally, record was performed, without what has a double-sided record function in said ink jet recording device changing the record concentration at the time of one side record and double-sided record.

[0005] Moreover, the ink on the surface of a record medium on the property which a record medium is made to breathe out an ink drop and forms an alphabetic character or an image, and immediately after record does not dry, but before said ink jet recording device moved to rear-face record, he was trying to prevent the dirt in said ink by establishing a fixed standby time.

[0006]

[Problem(s) to be Solved by the Invention] However, since a difference arose in time amount until ink dries according to the class of record medium etc. even if it establishes a fixed standby time before moving to rear-face record like the above-mentioned conventional example, it might move to rear-face record in the condition that the ink on the surface of a record medium is not dry, and there was a problem that the dirt in the ink etc. was generated. Moreover, it influences a throughput and is not practical if sufficient standby time for corresponding to all record media is established.

[0007] Moreover, since the record concentration at the time of one side record and double-sided record was the same, the so-called reverse side projection of the image on the rear face of a record medium having been transparent on the record-medium surface with the class of record medium etc. at the time of double-sided record, and being reflected might take place, and there was a problem of being hard coming to read the image recorded in that case.

[0008] Then, the purpose of this invention solves said technical problem, and uses as an offer plug the ink jet recording device which prevented dirt and the reverse side projection in ink.

[0009]

[Means for Solving the Problem] The configuration of an ink-jet recording device of this invention for attaining said purpose is characterized by to have an ink-jet record means which records by breathing out ink according to a signal, a conveyance means convey a record medium at the time of one side and double-sided record, and a means which carries out adjustable [of

the standby time before an after / surface record termination / rear-face recording start of a record medium at the time of double-sided record] according to a class of said record medium. [0010] A configuration of an ink jet recording device of this invention for attaining said purpose is characterized by having a means which carries out adjustable [of an ink jet record means which records by breathing out ink according to a signal, a conveyance means to convey a record medium at the time of one side and double-sided record, and record concentration at the time of one side record and record concentration at the time of double-sided record].

[0011]

[Function] If it is in the ink jet recording device concerning said configuration, dirt and the reverse side projection in ink are prevented by carrying out adjustable [of the standby time before moving to rear-face record] according to the class of record medium.

[0012] If it is in the ink jet recording device concerning said configuration, reverse side projection of ink is prevented by carrying out adjustable [of the record concentration at the time of one side record, and the record concentration at the time of double-sided record].

[0013]

[Example]

The [1st example] The ink jet recording device applied to the 1st example of this invention next is explained with reference to a drawing.

[0014] An approximate account is first carried out about the whole ink jet recording device configuration. Drawing 1 is cross-section configuration explanatory drawing of the printer which is one example of the ink jet recording device concerning this invention.

[0015] The platen 3 is supported free [rotation] through the platen shaft 2 by the main part 1 of a printer, and the feed rollers 4 and 5 of a pair are arranged free [rotation] at this platen 3 bottom. The pressure welding of said feed rollers 4 and 5 is always carried out to the peripheral face of said platen 3, and they follow by rotation of a platen 3, and they are constituted so that a record medium 6 may be conveyed in the predetermined direction.

[0016] Moreover, the 1st guide plate 7 sets a platen 3 and a predetermined gap, and is arranged at the front side (left-hand side of drawing 1) of said platen 3. The carrier 8 is equipped with said 1st guide plate 7, and the non-illustrated recording head is carried in this carrier 8.

[0017] This equipment uses the ink jet recording method which breathes out and records ink from said recording head. That is, this recording head is equipped with an energy generation means to generate the drop formation energy made to act on the liquid in the energy operation section prepared in a detailed liquid delivery (orifice), a liquid route, and a part of this liquid route, and this operation section.

[0018] Irradiate electromagnetic waves, such as the record method using electric machine conversion objects, such as a piezo-electric element, and an energy-generation means generate such energy, and laser, make them generate heat, and there is the record method using an energy-generation means heat a liquid and make a liquid breathe out with electric thermal-conversion objects, such as a heater element which has the record method using an energy-generation means make a drop breathe out in the operation by this pyrexia, or an exoergic resistor, etc.

[0019] Since the recording head used for the ink jet record method of making a liquid breathing out with heat energy also in it can arrange the liquid delivery (orifice) for breathing out the drop for record and forming the drop for regurgitation to high density, it can record high resolution. The recording head which used an electric thermal-conversion object as an energy-generation means also in it is easy also for miniaturization, and the advance of technology and the improvement in reliability in the latest semiconductor field can utilize the advantage of remarkable IC technology or micro processing technology more than enough, and high-density-assembly-izing is easy for it, and it is advantageous from a manufacturing cost being cheap.

[0020] Moreover, the bail roller 9 is arranged in the front bottom (upper left side of drawing 1) of said platen 3, and this bail roller 9 is constituted by the platen 3 by the non-illustrated driving source possible [a pressure welding (continuous line location of drawing 1), or alienation (dashed line location of drawing 1)]. Moreover, said bail roller 9 has the desirable thing of a stellate configuration, in order to prevent the dirt in ink etc. Furthermore, the 2nd guide plate 10

and the 3rd guide plate 11 are arranged in said bail roller 9 bottom, and it is constituted so that the record medium 6 after the 2nd pass may pass through between said guide plates 10 and 11. [0021] On the other hand, the axis of rotation 13 of the 1st discharge roller 12 is arranged near [the near side (right-hand side of drawing 1) of the 3rd guide plate 11, and on the common tangent which passes along the pressure-welding point of this bail roller 9 and a platen 3 at the time of the pressure welding to the platen 3 of the bail roller 9 if it puts in another way]. Said 1st discharge roller 12 is being fixed to said axis of rotation 13, and said axis of rotation 13 is connected with said platen shaft 2 by the non-illustrated gear, the belt, the friction roller, etc. [0022] Moreover, as shown in details at drawing 2, two or more tooth parts 14 are formed in the 1 side-edge side of the 1st discharge roller 12 every fixed gap at the circumferential direction, this tooth part 14 and after the back end section of a record medium 6 has inserted among 14, it is raised, and it is constituted so that fixed angle rotation may be carried out. Furthermore, the follower roller 15 supported free [rotation on a shaft 16] is carrying out the pressure welding to the peripheral face of the 1st discharge roller 12, and said follower roller 15 is constituted so that it may follow and rotate to rotation of the 1st discharge roller 12. In addition, although said follower roller 15 is not illustrated, it may be a spur roller of a stellate configuration.

[0023] Moreover, the 2nd discharge roller 17 for the time of the 2nd pass is arranged at the upper part side of said 2nd guide plate 10 and the 3rd guide plate 11, and this 2nd discharge roller 17 is being fixed to the axis of rotation 18. Said axis of rotation 18 is connected with the platen shaft 2 by the non-illustrated gear, the belt, the friction roller, etc.

[0024] Moreover, two or more tooth parts 19 are formed in the 1 side-edge side of the 2nd discharge roller 17 as well as said 1st discharge roller 12 every fixed gap at the circumferential direction. Moreover, while bearing 18a is fitted in the axis of rotation 18 of said 2nd discharge roller 17, the periphery of said bearing 18a is equipped with the paper tray 20 free [rotation].

Said paper tray 20 is for loading the record medium 6 after the 2nd pass, and has prevented *** to a near side with the stopper 21. Moreover, the follower roller 22 supported free

[rotation] at the shaft 23 as well as said 1st discharge roller 12 is carrying out the pressure welding also to the peripheral face of said 2nd discharge roller 17, and said follower roller 22 is constituted so that it may follow and rotate to rotation of the 2nd discharge roller 17.

Furthermore, said shaft 23 is equipped with the presser-foot board 24 free [rotation], and **** of the record medium 6 loaded into said paper tray 20 with this presser-foot board 24 is prevented. In addition, a record medium 6 falls, and 25 is a prevention board and is attached in the upper surface of the main part 1 of a printer.

[0025] Next, an operation of the printer constituted as mentioned above is explained with reference to drawing 1 thru/or drawing 6.

[0026] As first shown in drawing 1, it sets so that the surface 6a may become a recording surface about a record medium 6 at the time of the 1st pass. In addition, in case the insertion set of the record medium 6 is carried out, it is made for a carrier 8 to be located in the crosswise center section of a record medium, and is made to send in along with the 1st guide plate 7. Moreover, the bail roller 9 is changed into the condition (continuous line location of drawing 1) that the pressure welding was carried out to the platen 3 by the constant pressure, at this time. And if the rotation drive of the platen 3 is carried out, as shown in drawing 3, the point of a record medium 6 will be led to the plane of composition of a platen 3 and the bail roller 9, and record of an image will be performed by the non-illustrated recording head.

[0027] After record, said record medium 6 is discharged by the tangential direction of a platen 3 and the bail roller 9, and is led to the join of the 1st discharge roller 12 and the follower roller 15. And as shown in drawing 4, it inserts between the tooth part 14 of the 1st discharge roller 12, and 14, fixed angle rotation is raised and carried out by rotation of the 1st discharge roller 12, and the back end section of a record medium 6 is led to insertion opening of a record medium, as shown in drawing 5. At this time, said record medium 6 will be in the condition of having been set so that that rear-face 6b might become a recording surface.

[0028] Next, the bail roller 9 is missed in the continuous line location from the dashed line location on a platen 3, as beforehand shown in drawing 5 at the time of the 2nd pass. Therefore, since the bail roller 9 is in the condition of having been estranged from the platen 3, beforehand

at the time of this 2nd pass, the point of a record medium 6 reaches the join of the 2nd discharge roller 17 for the 2nd pass, and the follower roller 22 through the path which consists of the 2nd guide plate 10 and the 3rd guide plate 11 as shown in drawing 6, after passing through between a platen 3 and the 1st guide plate 7. And after this join passage is stuffed into the paper tray 20 after having been regulated by said presser-foot board 24, and finally, the back end section of a record medium 6 is raised by the tooth part 19 of the 2nd discharge roller 17, and it is loaded into the paper tray 20. In addition, record is performed to rear-face 6b of a record medium 6 at the time of the 2nd pass.

[0029] Next, the control and its actuation at the time of the double-sided record in the printer of said configuration are explained with reference to drawing 7 and drawing 8.

[0030] Drawing 7 is the block diagram showing the electrical circuit of said printer. In drawing 7, the address bus, the data bus, and the bus 40 that consists of a control signal which controls them are outputted from CPU (central processing unit) 30, and the bus 40 is connected to the sensor section 39 which performs home location detection of ROM31, RAM32, the data receive section 33, the record-medium class distinction section 34, the standby-time timer section 35, the recording head migration mechanical component 36, the record-medium conveyance mechanical component 37, the recording head record mechanical component 38, and a recording head, existence detection of a record medium, etc.

[0031] Said CPU30 is controlled by the program built in ROM31. The recording information transmitted from the host computer is received in the data receive section 33 by the side of a printer. The data receive section 33 delivers and receives data according to the condition of a printer, and received data are stored in RAM32. CPU30 controls the recording head migration mechanical component 36, the record-medium conveyance mechanical component 37, and the recording head record mechanical component 38 by the record instruction from a host computer, respectively.

[0032] Drawing 8 is a flow chart which shows the control action of said printer. In drawing 8, if a power supply is supplied to a printer (step S51) and record data is received from a host computer (step S52), a printer inhales a record medium (step S53), and stores the record data for one line in RAM32. And record of one line is performed by the record instruction from 1 line-buffer full or a host computer (step S54). Sequential record is performed for said actuation for every [a repeat and] line (step S55).

[0033] After the record for 1 page (surface record) is completed in step S55, it progresses to step S56 and discharge of a record medium is performed. Here, when said record actuation is one side record, it progresses to step S57, and it is discharged on a paper tray, and when it is double-sided record, said record medium progresses to step S58, and is set to the inhalation location (insertion opening side of a record medium) of rear-face record. If said record medium is set to the inhalation location of rear-face record, before progressing to step S59 and moving to rear-face record, predetermined time standby will be carried out. A setup of said standby time sets to the timer of CPU30 the standby time according to the class of record medium set up beforehand, and is performed by starting a timer. After timer setup-time progresses, it progresses to step S60, a record medium is inhaled and subsequently to step S54 it progresses, and below, like actuation of surface record, record data is received and it records for every line from a host computer. If 1-page record termination is carried out, a record medium will be discharged and surface record and rear-face record will be completed.

[0034] Although the standby time before moving to rear-face record according to the class of record medium is made adjustable in the example mentioned above, it is also possible to make said standby time adjustable with humidity and temperature. Moreover, a user is able to form a switch and to enable it to set up time amount freely.

[0035] The [2nd example] The ink jet recording device applied to the 2nd example of this invention next is explained with reference to a drawing. In addition, since it is the 1st example mentioned above about the whole equipment configuration, and an abbreviation EQC, detailed explanation is omitted and explains only the feature below here.

[0036] The printer as an ink jet recording device concerning this example is constituted so that it can carry out adjustable [of the record concentration at the time of one side record, and the

record concentration at the time of double-sided record]. Hereafter, it explains with reference to a drawing.

[0037] Drawing 9 is a flow chart which shows the flow of actuation of the printer concerning this invention. If the record data from a host computer is received when the power supply of a printer is turned on (step S61) (step S62), the information will judge one side record or double-sided record inside a printer (step S63), and record concentration adjustment will be performed according to it. If it is one side record, it will record by ordinary record concentration (step S64), and record concentration adjustment which will be later mentioned if it is double-sided record is performed, and record concentration is made thin (step S65). Sequential record is performed for every line after that (steps S66 and S67), and if it is (steps S68 and S69) and one side record when record for 1 page is completed, a record medium will be discharged on a paper tray (step S70). If it is double-sided record in step S71, a record medium is discharged in an inhalation location for rear-face record (step S72), the process after step S62 will be discharged after a repeat and double-sided record termination below, and a record medium will be discharged on a paper tray (step S73).

[0038] Next, the adjustment device of said record concentration is explained with reference to drawing 10 thru/or drawing 12.

[0039] (1 of the 2nd example) In drawing 10, when a record factor is transmitted to a double-sided recording information list from a host computer 81, Maine CPU 82 which received the record instruction gives [giving a factice CPU 83 control to which the amount of ink breathed out from a recording head 84 is made fewer than the time of the usual one side record, and] an instruction. The factice CPU 83 who received this instruction changes ink discharge quantity by the recording method. It enables this to change the record concentration at the time of one side record and double-sided record.

[0040] (2 of the 2nd example) By constituting so that an ink jet printer may have the ink (henceforth, dark ink) generally used and thinner ink (henceforth, thin ink), as shown in drawing 11 again. When a record factor is transmitted to a recording information list from a host computer 81, An instruction is given [controlling to record using thin ink 85b, and] when dark ink 85a generally used when Maine CPU 82 which received the record instruction judges it as one side record to a factice CPU 83 is judged to be double-sided record. If it does in this way, it will become possible to change record concentration according to the class of record by work of a factice CPU 83.

[0041] (3 of the 2nd example) Although ordinary record is performed at the time of one side record, record concentration may be adjusted again by constituting so that it may record by thinning out in electric control at the time of double-sided record. It is the means which records by opening a dot space as shown in drawing 12 as "It thins out." In drawing 12, it is a record pattern at the time of recording by the record pattern at the time of recording ordinarily and (B) thinning out (A), and ~ shows a record dot and O shows the space. The record concentration at the time of double-sided record turns into thin record concentration by constituting so that it may record as mentioned above as compared with the time of one side record. Moreover, if the gap to thin out is changed electrically, it will carry out to the ability also of the thinness of record concentration to carry out adjustable.

[0042] Although the ink jet recording method was used as a record means in [Other Example(s)] and the example mentioned above, it is still more desirable, when growth of the air bubbles produced in ink using film boiling produced in ink with the heat energy which energizes on an electric thermal-conversion object according to a record signal, and is impressed with said electric thermal-conversion object, and contraction constitute so that it may record by breathing out ink from a delivery.

[0043] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system. On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand. By impressing at least one driving signal which gives the

rapid temperature rise which supports recording information and exceeds nucleate boiling. Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid is made to breathe out through the opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instantly, the especially excellent regurgitation of a liquid can be attained and it is more desirable.

[0044] As a driving signal of the shape of said pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of said heat operating surface are adopted, further excellent record can be performed.

[0045] As a configuration of a recording head, the configuration using the U.S. Pat. No. 4558333 specification and 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight line-like liquid flow channel or right angle liquid flow channel) of a delivery which is indicated by each above-mentioned specification, a liquid route, and an electric thermal-conversion object is crooked is also included in this invention.

[0046] Moreover, it is a book to two or more electric thermal-conversion objects also as a configuration based on JP 59-138461A which indicates the configuration whose puncturing which absorbs the pressure wave of JP 59-123670A which indicates the configuration which makes a common slit the regurgitation section of an electric thermal-conversion object, or heat energy is made to correspond to the regurgitation section. Namely, no matter the gestalt of a recording head may be what thing, it is because it can record now efficiently certainly according to this invention.

[0047] Furthermore, this invention is effectively applicable also to the recording head of the full line type which has the length corresponding to the maximum width of the record medium which can record a recording device. As such a recording head, any of the configuration which fills the length with the combination of two or more recording heads, and the configuration as one recording head formed in one are sufficient.

[0048] In addition, the thing of the serial type mentioned above may also use the recording head fixed to carriage, the recording head exchangeable chip type to which the electric connection with the main part of equipment and supply of the ink from the main part of equipment are attained by carriage being equipped, or the recording head of the cartridge type with which the ink tank was formed in the recording head itself in one.

[0049] Moreover, since the effect of ***** can be stabilized further, it is desirable to add the recovery means of a recording head established as a configuration of the recording device of this invention, a preliminary auxiliary means, etc. If these are mentioned concretely, it is effective in order to perform record stabilized by performing the preheating means by the heating elements different from a capping means, a cleaning means, pressurization or a suction means, an electric thermal-conversion type, or this or these combination over a recording head, and reserve regurgitation mode in which the regurgitation different from record is performed.

[0050] Moreover, although only one piece was prepared also about the class thru/or the number of a recording head carried in carriage, for example corresponding to monochromatic ink, corresponding to two or more ink which differs in an others and record color or concentration, more than one may be prepared the number of pieces. That is, although the paddle gap by not the recording mode of only mainstream colors, such as black, but two or more combination which constitutes a recording head in one is sufficient as a recording mode of a recording device, it can apply also to equipment equipped with full color at least one by the double color color of a different color, or color mixture, for example.

[0051] Furthermore, in addition, it is ink solidified less than [a room temperature or it] although ink is explained as a liquid in the example mentioned above, and since the thing softened or liquefied at a room temperature or the thing which carries out temperature control as a temperature control is performed for ink itself within the limits of 30 degrees C or more 70

degrees C or less and it is in a stabilization regurgitation range about the viscosity of ink by the ink-jet recording method is common, ink should just make the shape of liquid at the time of use record signal grant. In addition, it carries out whether the ink which prevents by making the temperature up by heat energy use it positively as energy of the change of state from a solid condition to the liquid condition of ink, or is solidified in the state of neglect for the purpose of antiflashing of ink is used. Anyway, ink liquefies by grant according to the record signal of heat energy. It can apply, also when using the ink of the property which will not be liquefied without heat energy, such as that by which liquefied ink is breathed out, and a thing which it already begins to solidify when reaching a record sheet.

[0052] The ink in such a case is good for a porosity sheet crevice or a through tube which is indicated by JP 54-56847A or JP 60-71260A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the condition of having been held as a solid. The most effective thing performs the film-boiling method mentioned above to each ink mentioned above. [0053] Furthermore, although the image printing terminal of information management systems, such as a computer, carries out and it is used as a gestalt of the ink jet recording device mentioned above, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

[0054] In addition, although the example using the ink jet recording method as a record means mentioned above was explained, it is not necessary to limit the recording method of this invention to an ink jet recording method, and even if they are otherwise recording methods, such as a thermal imprint recording method, and thermal recording, a wire dot recording method, or the other recording method, it can be applied. Moreover, it is not necessary to limit to a serial recording method, and the so-called Rhine recording method may be used.

[0055]

[Effect of the Invention] Since dryness of the ink of the record medium recorded by constituting so that it may carry out adjustable [of the standby time before the after / surface record termination / rear-face recording start at the time of double-sided record] according to the class of record medium can be carried out to regularity as explained above, the dirt in ink etc. can be prevented, and it is not necessary to establish the standby time beyond necessity, and improvement in the throughput in double-sided record can also be realized.

[0056] Moreover, the reverse side projection at the time of double-sided record can be prevented by constituting so that it may carry out adjustable [of the record concentration at the time of one side record, and the record concentration at the time of double-sided record].

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is cross-section configuration explanatory drawing of the printer which is one example of an ink jet recording device.

[Drawing 2] It is strabism explanatory drawing having expanded and shown the discharge roller and the follower roller.

[Drawing 3] It is the important section enlarged view in which it was expanded and shown near the recording system used as the important section of said printer.

[Drawing 4] It is the important section enlarged view in which it was expanded and shown near the recording system used as the important section of said printer.

[Drawing 5] It is the important section enlarged view in which it was expanded and shown near the recording system used as the important section of said printer.

[Drawing 6] It is the important section enlarged view in which it was expanded and shown near the recording system used as the important section of said printer.

[Drawing 7] It is the block diagram showing the electrical circuit of said printer.

[Drawing 8] It is the flow chart which shows the flow of the control action of said printer.

[Drawing 9] It is the flow chart which shows the flow of actuation of the printer concerning the 2nd example of this invention.

[Drawing 10] It is explanatory drawing of the adjustment device of record concentration.

[Drawing 11] It is explanatory drawing of the adjustment device of record concentration.

[Drawing 12] It is explanatory drawing showing the record pattern when adjusting record concentration.

[Description of Notations]

1 — Main part of a printer 2 — Platen shaft

3 — Platen 4 Five — Feed roller

6 — Record medium 7 — The 1st guide plate

8 — Carrier 9 — Bail roller

10 — The 2nd guide plate 11 — The 3rd guide plate

12 — The 1st discharge roller 13 — Axis of rotation

14 — Tooth part 15 — Follower roller

16 — Shaft 17 — The 2nd discharge roller

18 — Axis of rotation 18a — Bearing

19 — Tooth part 20 — Paper tray

21 — Stopper 22 — Follower roller

23 — Shaft 24 — Presser-foot board

25 — It falls and is a prevention board.

30 — CPU 31 — ROM

32 — RAM 33 — Data receive section

34 — Record-medium class distinction section 35 — Standby-time timer section

36 — Recording head migration mechanical component 37 — Record-medium conveyance mechanical component

38 — Recording head record mechanical component 39 — Sensor section

40 — Bus
81 — Host computer 82 — Maine CPU
83 — Factice CPU 84 — Recording head
85a — Dark ink 85b — Thin ink

[Translation done.]

である。

【0015】 プリント本体1にはプラテン軸2を介してプラテン3が回転自在に支持されており、このプラテン3の下側には一対のワイロローラ4、5が回転自在に配置されている。前記ワイロローラ4、5は前記プラテン3の外周面に常時圧接しており、プラテン3の回転によって従動され、記録媒体6を所定方向に搬送するように構成されている。

【0016】 また、前記プラテン3の前方面（図1の左側）には第1ガイド板7がプラテン3と所定間隔を置いて配置されている。前記第1ガイド板7はキヤリヤ8に装設されており、このキヤリヤ8には不図示の記録ヘッドが搭載されている。

【0017】 本装置は前記記録ヘッドからインクを吐出して記録するインクジェット記録方式を用いている。即ち、この記録ヘッドは致密な液体吐出口（オリフィス）、流路及びこの流路の一部に設けられるエネルギー発生部と、該発生部にある液体に作用させる液滴形成エネルギーを用いるエネルギー発生手段を備えている。

【0018】 このようなエネルギー発生手段をエネルギー発生手段としてはピエゾ素子等の電気機械変換体を用いた記録方法、レーザー等の電磁波を照射して発熱させて、該発熱による作用で液滴を吐出させるエネルギー発生手段を用いた記録方法、あるいは発熱低圧液体を有する発熱素子等の電気熱変換体によって液体を加熱して液体を吐出させるエネルギー発生手段を用いた記録方法等がある。

【0019】 その中でも熱エネルギーによって液体を吐出させるインクジェット記録方式に用いられる記録ヘッドは、記録用の液滴を吐出して吐出液滴を形成するための液体吐出口（オリフィス）を高密度に配列することができるとともに高解像度の記録をすることが可能である。その中でも電気熱変換体をエネルギー発生手段として用いた記録ヘッドは、コンパクト化も容易であり、且つ最近の半導体分野における技術の進歩と信頼性の向上が著しい（技術やマイクロ加工技術の基所を十二分に活用出来、高密度実装化が容易で、製造コストも安価なことから有利である）。

【0020】 また、前記プラテン3の前方面（図1の左上面）にはベイルローラ9が配設されており、このベイルローラ9は不図示の駆動部によりプラテン3に圧接（図1の実装位置）又は隙間（図1の接触位置）可能に構成されている。また、前記ベイルローラ9はインク等による汚れを防止するために星形状のものに置き換え、更に、前記ベイルローラ9の上側には第2ガイド板10及び第3ガイド板11が配設されており、第2ガイド板10及び第3ガイド板11の間を通過するように構成されている。

【0021】 一方、第3ガイド板11の手前側（図1の右側）、換言すればベイルローラ9のプラテン3への圧接

時、このベイルローラ9とプラテン3の圧接点を通る共通接線上の近傍には第1排出ローラ12の回転軸13が配設されている。前記第1排出ローラ12は前記回転軸13に固定されており、前記回転軸13は不図示のギヤ、ベルト、ワリリョンローラ等により前記プラテン軸2に連結されている。

【0022】 また図2に詳細に示すように、第1排出ローラ12の一端側には円周方向に一定間隔おきに複数の歯部14が形成されており、この歯部14、14間には記録媒体6の後端部が嵌入した状態で持ち上げられ、一定角度回転させられるように構成されており、更に第1排出ローラ12の外周面には歯部16に回転自在に支持された従動ローラ15が圧接しており、前記従動ローラ15は第1排出ローラ12の回転に追従して回転するように構成されている。尚、前記従動ローラ15は図示していないが星形状の拍車ローラであってよい。

【0023】 また、前記第2ガイド板10及び第3ガイド板11の上方面には、第2パス時用の第2排出ローラ17が配置されており、この第2排出ローラ17は回転軸18に固定されている。前記回転軸18は不図示のギヤ、ベルト、ワリリョンローラ等によってプラテン軸2に連結されている。

【0024】 また、第2排出ローラ17の一端側にも前記第1排出ローラ12と同様に円周方向に一定間隔おきに複数の歯部19が形成されており、また、前記第2排出ローラ17の回転軸18には歯受18aが嵌装されていると共に、前記歯受18aの外周にはベーパートレイ20が回転自在に装設されている。前記ベーパートレイ20は第2パス後の記録媒体6を搬載するためのものであって、ストッパ21によって手前側への倒れを防止している。また、前記第2排出ローラ17の外周面には前記第1排出ローラ12と同様に歯部17aに回転自在に支持された従動ローラ22が圧接しており、前記従動ローラ22は第2排出ローラ17の回転に追従して回転するように構成されている。更に前記歯部22には押さえ板24が回転自在に装設されており、この押さえ板24によって前記ベーパートレイ20に積載された記録媒体6の倒れを防止している。尚、25は記録媒体6の倒れ防止板であって、プリント本体1の上面に取り付けられている。

【0025】 次に、以上のように構成されたプリンタの作用について図1乃至図6を参照して説明する。

【0026】 先ず図1に示すように、第1パス時においては記録媒体6をその裏面6aが記録面になるようにセリツとする。尚、記録媒体6を挿入セリツする際は、キヤリヤ8が記録媒体6の裏面方向中央部に位置するように、第1ガイド板7に沿って送り込むようにする。また、このときベイルローラ9は一定圧力でプラテン3に圧接された状態（図1の実装位置）にしておく。そして、プラテン3を回転駆動すると、図3に示すように、記録媒体6の先端部はプラテン3とベイルローラ9との接合面に

導かれ、不図示の記録ヘッドにより画像の記録が行われる。

【0027】 記録後、前記記録媒体6はプラテン3とベイルローラ9との接合方向に排出され、第1排出ローラ12と従動ローラ15との接合点に導かれる。そして、記録媒体6の後端部は、図4に示すように第1排出ローラ12の歯部14、14間に嵌入し、第1排出ローラ12の回転によって持ち上げられ一定角度回転され、図5に示すように記録媒体6の挿入口に導かれる。このとき前記記録媒体6は、その裏面6bが記録面となるようにセリツされた状態となる。

【0028】 次に、第2パス時には予めベイルローラ9を図5に示すように、プラテン3上の接触位置から接触位置に逃がしておく。従って、この第2パス時は予めベイルローラ9がプラテン3より離間された状態にあるので、記録媒体6の先端部はプラテン3と第1ガイド板7との間を通過した後、図6に示すように第2ガイド板10及び第3ガイド板11で構成される通路を通って第2パス用の第2排出ローラ17と従動ローラ22との接合点に達する。そして、この接合点通過後は前記押さえ板24に規制された状態でベーパートレイ20に押し込まれていき、最後に記録媒体6の後端部が第2排出ローラ17の歯部19によって持ち上げられ、ベーパートレイ20に搬載される。尚、第2パス時は記録媒体6の裏面6bに記録が行われる。

【0029】 次に、前記構成のプリンタにおける前面記録時の制御及びその動作について図7及び図8を参照して説明する。

【0030】 図7は前記プリンタの電気回路を示すブロック図である。図7において、CPU（中央処理装置）30からアドレスバス、データバス、及びそれらを制御する制御部31からなるバス40が出力されており、バス40はROM431、RAM432、データ受信部33、記録媒体搬送制御部36、記録媒体搬送駆動部37、記録ヘッド駆動部38、記録ヘッドのホーム位置検出及び記録媒体の有無検出等を行うセンサ部39に接続されている。

【0031】 前記CPU30はROM431に内蔵されたプログラムにより制御される。ホストコンピュータから送信された記録データ、プリンタ側のデータ受信部33で受信される。データ受信部33はプリンタの状態によりデータの授受を行いRAM432に受信データが格納される。ホストコンピュータからの記録命令によりCPU30は記録ヘッド移動駆動部36、記録媒体搬送駆動部37、記録ヘッド移動駆動部38それぞれを制御する。

【0032】 図8は前記プリンタの制御動作を示すフローチャートである。図8において、プリンタに電源が投入され（ステップS51）、ホストコンピュータより記録データを授受すると（ステップS52）、プリンタは記録媒体6を吸入し（ステップS53）、1ライン分の記録デー

タをRAM432に格納する。そして1ライン分の記録データを読み出し（ステップS54）、前記動作を繰り返す。1ライン毎に順次記録を行う（ステップS55）。

【0033】 ステップS55において1ページ分の記録（裏面記録）が終了すると、ステップS56に進み記録媒体6の排出が行われる。ここで、前記記録動作が片面記録であった場合はステップS57に進み前記記録媒体6はベーパートレイ11上に排出され、片面記録であった場合はステップS58に進み裏面記録の吸入位置（記録媒体6の挿入口側）にセリツされる。前記記録媒体が裏面記録に移る前に所定時間待機する。前記待機時間の設定は、予め設定されている記録媒体の種類に応じた待機時間をCPU30のマイナーにセリツし、タイマーを起動させることにより行われる。タイマー設定時間経過後、ステップS60に進み記録媒体6を吸入し、次いでステップS54に進み以下表面記録の動作と同様にホストコンピュータから記録データを受信し、1ライン毎に記録を行う。1ページ記録終了したら、記録媒体6を排出し表面記録及び裏面記録を完了する。

【0034】 前述した実施例では記録媒体の種類により裏面記録における前記待機時間を可変にしているが、温度、湿度により前記待機時間を可変にすることも可能である。また、スイッチを設けてユーザが自由に時間の設定が行えるようにすることも可能である。

【0035】（第2実施例）次に本発明の第2実施例に係るインクジェット記録装置について図9を参照して説明する。尚、装置の全体構成については前述した第1実施例と略同であるため、ここでは詳しい説明は省略し、以下特長についてのみ説明する。

【0036】 本実施例に係るインクジェット記録装置としてのプリンタは、片面記録時の記録速度と両面記録時の記録速度とを可変できるように構成されている。以下、図9を参照して説明する。

【0037】 図9は本発明に係るプリンタの動作の流れを示すフローチャートである。プリンタの電源がONされている時（ステップS61）、ホストコンピュータからの記録データを受信すると（ステップS62）、プリンタ内部でその情報から片面記録か両面記録かを判断し（ステップS63）、それに合わせて記録速度調整を行う。片面記録であれば普通の記録速度で記録を行い（ステップS64）、両面記録であれば後述する記録速度調整を行い、記録速度を遅くする（ステップS65）。その後1ライン毎に順次記録を行い（ステップS66、S67）、1ページ分の記録が終了した時点で（ステップS68、S69）、片面記録ならば記録媒体6はベーパートレイ11上に排出する（ステップS70）、ステップS71において両面記録ならば裏面記録のために記録媒体6を吸入位置に排出し（ステ

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ツフS72)、以下ステップS82以降の処理を繰り返し、画面記録終了後、記録媒体をベーパーレイト上に排出する(ステップS73)。

【0038】次に、前記記録速度の調整機構について図10乃至図12を参照して説明する。

【0039】(第2実施例の1) 図10において、ホストコンピュータ81から画面記録情報並びに記録要因が送信された場合、記録命令を受信したメインCP U82がサブCP U83に記録ヘッド84から吐出されるインク量を通常の画面記録時よりも少なくする制御を行うよう命令を与える。この命令を受け取ったサブCP U83は記録方式によりインク吐出量を変える、これにより片面記録時と両面記録時の記録速度を変えることが可能となる。

【0040】(第2実施例の2) また図11に示すように、インクジェットヘッドが一般に使用するインク(以下、顔インク)と稀めのインク(以下、薄インク)とを併用するように構成することにより、ホストコンピュータ81から記録情報並びに記録要因が送信された場合、記録命令を受信したメインCP U82がサブCP U83に片面記録と判断した場合は一般に使用する薄インク85aを、両面記録と判断した場合は薄インク85bを使用して記録を行うように制御するよう命令を与える。このようにすればサブCP U83の働きにより記録の種類により記録速度を変えることが可能となる。

【0041】(第2実施例の3) また、片面記録時においては普通の記録を行うが、両面記録時には電気的に制御して記録を行うように構成することによって記録速度の調整を行っても良い。【図10】とは図12に示すようにドット間隔をあけて記録を行う手段である。図12において、(A)は普通に記録を行った場合の記録パターン、(B)は間引いて記録を行った場合の記録パターンで、●は記録ドット、○はスペースを示している。上述のように記録を行うよう構成することによって両面記録時の記録速度は片面記録時と比較すると薄い記録速度となる。また間引く間隔を電気的に変化させれば記録速度の薄さも可変することが可能となる。

【0042】(他の実施例) また前述した実施例では記録手段としてインクジェット記録方式を用いたが、記録信号に応じて電気熱変換体に通電し、前記電気熱変換体によって印加される熱エネルギーにより、インクに生ずる蒸気膜を利用してインクに生ずる気泡の成長、収縮により、インクを吐出口より吐出して記録を行うように構成すると更に好ましい。

【0043】その代換的な構成や原理については、例えば米国特許第4723129号明細書、同第4740796号明細書に開示されている基本的な原理を用いて行うものが好ましい。この方式は別開シフト型、コンタミネアス型の何れにも適用可能であるが、特にオンデマンド型の場合には、液体(インク)が保持されているシートや液路に対応して配置されている電気熱変換体に、記録情

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報に対応して後述の電圧を越える急激な温度上昇を与える、少なくとも1つの駆動信号を印加することによって、電気熱変換体に熱エネルギーを発生せしめ、記録ヘッドの熱作用面に蒸気膜を生じさせて、結果的にこの駆動信号に一対一で対応した媒体内の気泡を形成出来るのでも有効である。この気泡の成長、収縮により吐出開口を介して液体を吐出させて、少なくとも1つの滴を形成する。この駆動信号をパルス形状とすると、即時適切に気泡の成長収縮が行われるので、特に優れた媒体の吐出が達成出来、より好ましい。

【0044】前記パルス形状の駆動信号としては、米国特許第446339号明細書、同第4348262号明細書に記載されているようなものが適している。尚、前記熱作用面の温度上昇率に関する第1の米国特許第431312号明細書に記載されている条件を採用すると、更に優れた記録を行うことが出来る。

【0045】記録ヘッドの構成としては、前述の各明細書に開示されているような吐出口、液路、電気熱変換体の組合せ構成(直線状液路又は直角液路)の側に熱作用部が屈曲する領域に配置されている構成を開示する米国特許第458383号明細書、同第4459600号明細書を用いた構成も本発明に含まれるものである。

【0046】また複数の電気熱変換体に対して、共通するスリットを電気熱変換体の吐出部とする構成を開示する特開昭59 12367号公報や熱エネルギーの圧力荷を受取る開孔を吐出部に形成させる構成を開示する特開昭59-138461号公報に基づいた構成としても本発明の効果は有効である。即ち、記録ヘッドの形骸がどのようなものであっても、本発明によれば記録を確実に効率よく行うことが出来るようになるからである。

【0047】更に、記録装置が記録出来る記録媒体の最大幅に対応した長さを有するフルインクタイプの記録ヘッドに対しても本発明は有効に適用出来る。そのような記録ヘッドとしては、複製記録ヘッドの組合せによって、その長さを増やす構成や、一体的に形成された1個の記録ヘッドとしての構成のいずれでも良い。

【0048】加えて、前述したシリアルタイプのものでも、キャリアに固定された記録ヘッド、或いはキャリアに装着されることと装置本体との電気的な接続や装置本体からのインクの供給が可能になる交換自在のタイプタイプの記録ヘッド、或いは記録ヘッド自体に一体的にインクタンクが設けられたカートリッジタイプの記録ヘッドを用いても良い。

【0049】また本発明の記録装置の構成として設けられる、記録ヘッドの回復手段、予備的な補助手段等を加えることは本発明をのめ度を一層安定出来るのでも好ましいものである。これらを具体的に挙げれば、記録ヘッドに対してのキャッピング手段、クリーニング手段、加圧或いは吸引手段、電気熱変換タイプ或いはこれは別加熱素子或いはこれらの組合せによる予備加熱手段、

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記録とは別の吐出を行う予備吐出モードを行うことも安定した記録を行うために有効である。

【0050】またキャリアに搭載される記録ヘッドの種類ないし個数についても、例えば単色のインクに対応して1個のみが設けられたもの他、記録色や濃度を異にして複数のインクに対応して複数個が設けられるものであっても良い。即ち、例えば記録装置の記録モードとして単色のインクに対応して記録モードとして単色のインクのみを記録モードでなく、記録ヘッドを一体的に構成する複数個の組合せによるかきずれも良いが、異なる色の複色カラー、または単色によるフルカラーの少なくとも一つを備えた装置にも適用し得る。

【0051】更に加えて、前述した実施例に於いてはインクを液体として説明しているが、室温やそれ以下で固化するインクであって、室温で軟化若しくは液化するもの、或いはインクジェット記録方式ではインク自体を30℃以上70℃以下の範囲内で温度調整を行ってインクの粘性を安定吐出範囲にあるように温度制御するもの一般的なものであるから、使用記録信号付与時にインクが液状をなすものであれば良い。加えて、積極的に熱エネルギーによる昇温をインクの固形状態から液状状態への状態変化のエネルギーとして使用せしめることで防止するか、またはインクの蒸発防止を目的として放熱状態を固化するインクを用いるかして、いずれにしても熱エネルギーの記録信号に応じた付与によってインクが液化し、液状インクが吐出されるものや、記録ヘッドに到達する時点で必ず固化し始めるもの等のような、熱エネルギーによって初めて液化する性質のインクを使用する場合も適用可能である。

【0052】このような場合のインクは、特開昭54-568 47号公報或いは特開昭60-71260号公報に記載されるような、多孔質シート内部または貫通孔に液状又は固形物として保持された状態で、電気熱変換体に対して対向するような形態としても良い。上述した各インクに対して最も有効なものは、前述した蒸気膜方式を実行するものである。

【0053】更に、前述したインクジェット記録装置の形態としては、コンピュータ等の情報処理機器の画像出力端末として用いられるもの他、リード等と組み合わせた複写装置、更には送受信機能を有するフロッピー装置の形態をとるもの等であっても良い。

【0054】尚、前述した記録手段としてインクジェット記録方式を用いた例を説明したが、本発明の記録方式はインクジェット記録方式に限定する必要はなく、他にも熱転写記録方式や感熱記録方式、更にはフアイバーン記録方式等の記録方式、或いはそれ以外の記録方式であっても適用し得る。またシリアル記録方式に限定する必要もなく、所謂ライオン記録方式を用いても良い。

【0055】【発明の効果】以上説明したように、両面記録時にお

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る表面記録終了後裏面記録開始前の待機時間を記録媒体の運動に応じて可変するよう構成することにより、記録される記録媒体のインクの動きを一定にすることができ、インク等による汚れを防止でき、また必要以上の待機時間を要する必要もなく、両面記録におけるスループットの向上も実現できる。

【0056】また、片面記録時の記録速度と両面記録時の記録速度とを可変するよう構成することにより、両面記録時の遅延を防ぐことができる。

【図面の簡単な説明】

【図1】インクジェット記録装置の一実施例であるプリンタの断面構成説明図である。

【図2】排出ローラ及び送動ローラを拡大して示した斜視説明図である。

【図3】前記プリンタの要部となる記録系近傍を拡大して示した要部拡大図である。

【図4】前記プリンタの要部となる記録系近傍を拡大して示した要部拡大図である。

【図5】前記プリンタの要部となる記録系近傍を拡大して示した要部拡大図である。

【図6】前記プリンタの要部となる記録系近傍を拡大して示した要部拡大図である。

【図7】前記プリンタの電気回路を示すブロック図である。

【図8】前記プリンタの制御動作の流れを示すフローチャートである。

【図9】本発明の第2実施例に係るプリンタの動作の流れを示すフローチャートである。

【図10】記録速度の調整機構の説明図である。

【図11】記録速度の調整機構の説明図である。

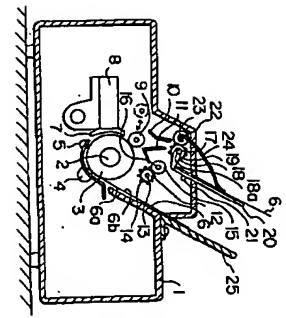
【図12】記録速度の調整を行った時の記録パターンを示す説明図である。

【符号の説明】

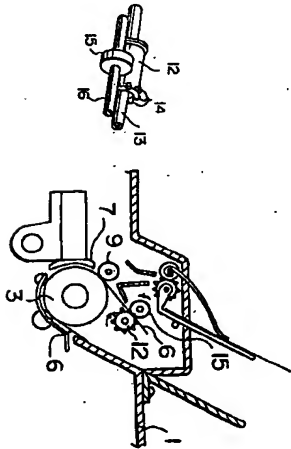
1…プリンタ本体	2…フロッピー駆動
3…フロッピーローラ	4, 5…フアイバー
6…記録媒体	7…第1ガイド板
8…キャリア	9…ベイドローラ
10…第2ガイド板	11…第3ガイド板
12…第1排出ローラ	13…回転軸
14…歯部	15…送動ローラ
16…軸	17…第2排出ローラ
18…回転軸	18a…軸受
19…歯部	20…ベーパーレイト
21…スロット	22…送動ローラ

- | | | | |
|-----------------|-----------------|----------------|--------------|
| 23...軸 | 24...押さえ板 | 送駆動部 | 39...センサ部 |
| 25...倒れ防止板 | 38...記録ヘッド移動駆動部 | | |
| 30...CPU | 31...ROM | 40...バス | 82...マイコンCPU |
| 32...RAM | 33...データ受信部 | 81...ホストコンピュータ | 83...マイコンCPU |
| | | U | 85a...漏インク |
| 34...記録媒体種類判別部 | 35...待機時間タイマ一部 | | 84...記録ヘッド |
| 36...記録ヘッド移動駆動部 | 37...記録媒体搬 | | 85b...漏インク |

【図1】

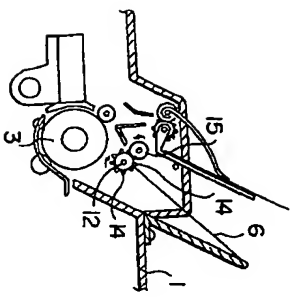


【図2】

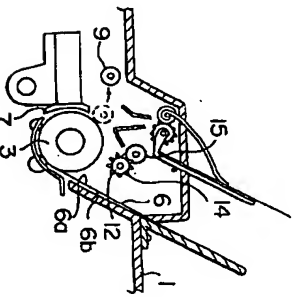


【図3】

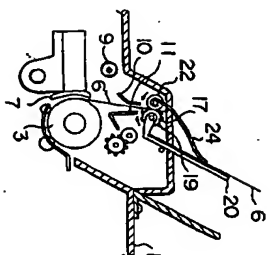
【図4】



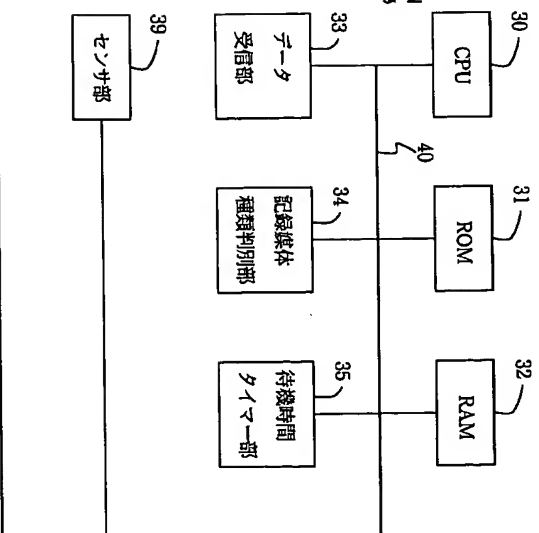
【図5】



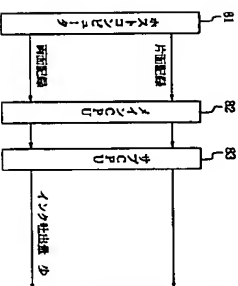
【図6】



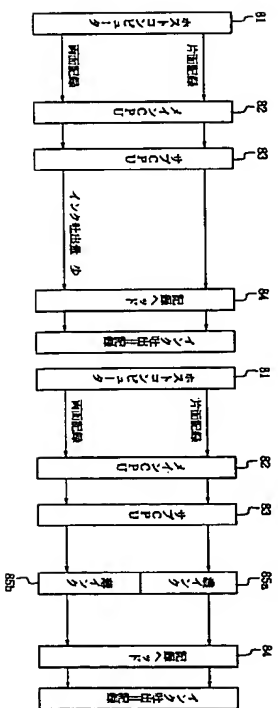
【図7】



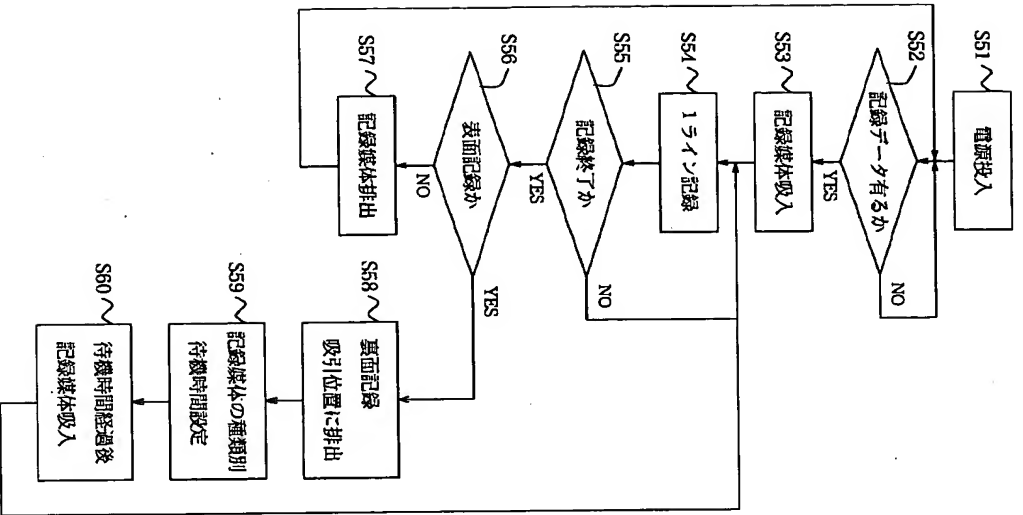
【図10】



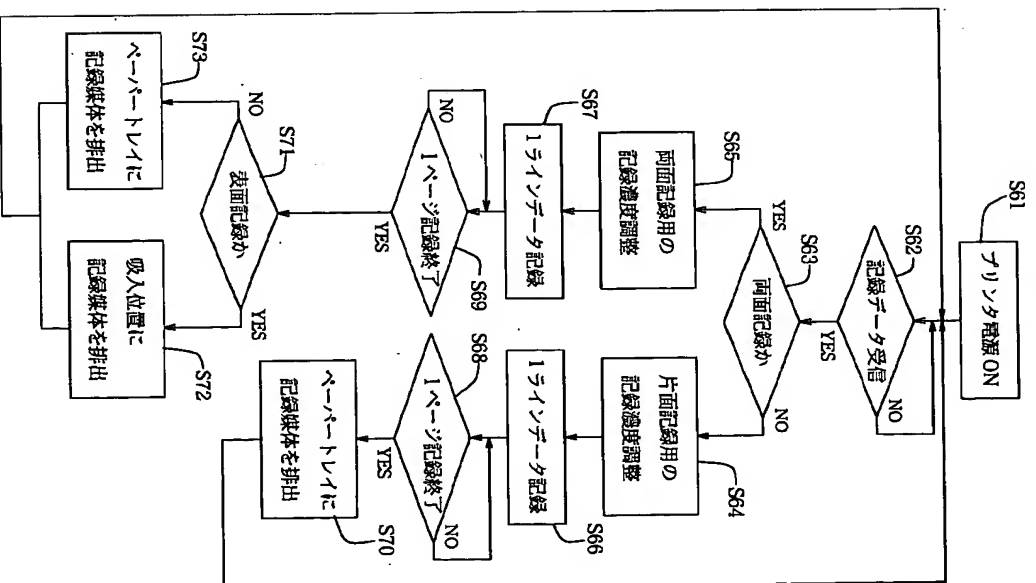
【図11】



【図8】



【図9】

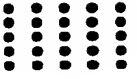


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【圖12】

(a)



(b)

